Sump and Depression Storage Volumes Figure 2 of the SWPPP depicts the sumps, depressions and associated storage volumes as determined by Stephens Environmental Consulting, Inc. (SECI). Sump piping configuration is also depicted in Figure 2.

Sump Volumes

SUMP #	RADIUS	DIAMETER	Volume (Cu.Ft.)
1	3.5	7	**38**
2	1.75	3.5	**10**
3	3.55	7.1	**40**
4	2.35	4.7	**17**
5	3.85	7.7	**47**
6	3.55	7.1	**40**

SUMP #7 (Concrete Vault)

Length	Width	Min Depth	Volume (cu.Ft.)
21.7	10.1	6.5	**1425**

Depression Storage Volumes

The Draft AOC requested the storage capacity of depressions onsite. That capacity was computed in our CAD software by prismoidal rule using the November 2019 field bare earth survey and three separate flat sheets set at elevation 7.3', the lowest depression rim elevation from the field dataset close to the expected discharge point near the outfall from SUMP 1. Note that in the field, the riser structures are field fabricated perforated CMP's set vertically with underground pipes connecting them together such that all waters within the approximately 19+-acre capture zone would accumulate in the impoundment prior to overflowing at this spill-over point behind the house. Because the discharge pipe to the wetlands south of the facility is capped at the upstream end, no flow occurs from the pipe directly to the stream and/or its wetlands via the pipe. This is clear from the previously submitted plans and discussions. We have assumed all sump areas will equalize instantaneously and that no storage above 7.3ft is available. Given that pipes slope upstream rather than downstream, flow is not typical gravity flow governed by Manning's equation and may be quite slow by comparison, allowing for temporary storage in the upstream sumps above the design elevation. We've made no attempt to model that likely condition.

Based on setting 7.3 feet as the elevation at which runoff would begin to spill into the swale from behind the house, which is conservative based on field shots, and does not account for slight sinking of the rod point into the ground or the effect of grass and/or micro-relief not captured by the field survey, etc., the storage capacity of the main impounded area is approximately 143,657 CF (1,074,554 gallons), the other two sump areas are 11,469 CF (85,788 gallons) (where the new bldg. is going) and 7,643 CF (57,169) (bunkers) respectively for a grand total of 162,769CF (1,217,512 gallons) of storage. *[Note that the volumes reported are not adjusted for significant figures only to avoid confusion in rounding. All estimates should be considered +/- 10% at a minimum.]* The main area accounts for 88.3% of the storage. Note that the storage capacity of the individual riser structures is statistically insignificant. The dimensions of the concrete vault are: 21.7 ft x 10.1ft x >6.5ft or 1410 CF, which is less than 1% of the primary impoundment storage area. This pit has been used as a dewatering point in the past. And will likely be used as such in the future as needed, including during construction of the future stormwater management facility.

Only depression storage that is intercepted by the sump collection system is included in this analysis. A small area at the southwesterly corner of the site, near Bunkers 1 & 2 was not captured by the sump system. Most of the rest of the site is noncontact water relative to regulated materials.

The contributing drainage area is a total of 827,291 SF, based on the predevelopment drainage subareas we previously computed for the design plans that contribute to the sumps. As such, the depth of storage may be computed by the storage volume (162,769 CF) divided by the contributing drainage area (827,291 SF) which is 0.1967 ft, or 2.36" This depth does not take into account any infiltration during a storm event. Stone beds in the greenhouses where flooding occurs are not less than 8" deep and at a porosity of 40% would account for an additional 3" of storage in those areas, offsetting reduced or insignificant infiltration over impervious areas. Further, the piles absorb moisture and can store more moisture than accounted for in typical stormwater analyses. So, it appears that it would take considerably more than a 3" rainfall event to generate runoff at the point of spillover behind the house from the approximately 19-acre contributing drainage area.